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Response to Office Action dated November 6, 2003

REMARKS/ARGUMENTS

Introduction

The present Amendment is in response to the Office Action mailed November 6, 2004. Claims 41, 46, and 50-51 are amended. Claims 41-47 and 50-64 are pending. Reconsideration of the application is respectfully requested in view of the above amendments to the claims and the following remarks.

Claim Objections

The Office Action of November 6, 2003 objects to claims 41-45 and 51 for the following informalities. The Office Action objected to claim 41 as being grammatically incorrect. Claim 41 has been amended as suggested by the Examiner and now recites "passing the second optical beam". This amendment overcomes the objection. The objections to claims 42-45 are also overcome the objection as they depend from claim 41.

The Examiner indicated that claim 51, line 3, has a dash between "pair" and "of" that should be removed. Claim 51 has been amended to remove the dash between "pair" and "of" as suggested by the Examiner.

Applicants request that the objections to claim 41-45, and 51 be withdrawn.

Rejections under 35 U.S.C. § 112

Claims 41-45 and 64 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner states that the limitations

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“passing a first optical beam from the first optical port to the second optical port, wherein the first optical beam enters at an angle such that the first optical beam diverges from the longitudinal axis” and

“passing a second optical beam from the second optical port to the third optical port, wherein the second optical beam enters aligned with the longitudinal axis”

in claim 41 are unclear as to where or what the optical beams enter. Claims 42-45, and 64 are rejected by the Examiner as they depend from claim 41 and inherit the deficiencies of claim 41.

Claim 41 has been amended to recite that the “first optical beam enters the optical circulator from the first optical port at an angle to the longitudinal axis” and that “the second optical beam enters the optical circulator from the second optical port aligned with the longitudinal axis”. These amendments clarify where and what the first and second optical beams enter as required by the Examiner. This amendment is believed to overcome the rejection to claims 41-45 and 64 under 35 U.S.C. § 112, second paragraph.

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Double Patenting Rejections

Claims 41-47 and 50-64 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 8, 14, and 33 of U.S. Patent 6,049,426 to Xic.

Applicant has submitted herewith a terminal disclaimer to overcome the double patenting rejection of the claims. Accordingly, Applicant respectfully requests that the rejection of claims 41-47 and 50-64 under the judicially created doctrine of obviousness-type double patenting be withdrawn.

Rejections Under 35 U.S.C. § 102

Claims 46-47 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,982,539 to Shirasaki. The Office Action alleges that Shirasaki discloses claim 46. To anticipate a claim, the reference must teach every element of the claim. More specifically, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). The following discussion illustrates that the elements as set forth in the claims, are not found in Shirasaki as cited by the Examiner. Applicants therefore respectfully traverse the rejection of claims 46-47 under 35 U.S.C. § 102(b) for at least the following reasons.

Claim 46 requires "passing a first optical beam through a nonreciprocal optical device from a first port to a second port." The optical device includes a first compound beam angle turner, a second compound beam angle turner and a complete gap. Claim 46 further requires "the first beam angle turner turns the first optical beam to converge towards a longitudinal axis

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of the nonreciprocal optical device and the second beam angle turner aligns the first optical beam with the longitudinal axis".

One embodiment of claim 46 is shown in Figure 2A. Figure 2A illustrates a first optical beam from a first port 102 to a second port 106. In Figure 2A, first beam angle turners 130A-B turn a first optical beam to converge towards a longitudinal axis of the optical device. The second beam angle turners 140A-B then align the first optical beam with the longitudinal axis of the optical device. An example of a second optical beam from the port 106 to the port 104 is also shown in Figure 2A. For the second optical beam, the second beam angle turners 140A-B turn the second optical beam away from the longitudinal axis of the nonreciprocal optical device. The first beam angle turners 130A-B next turn the second optical beam back towards the longitudinal axis of the nonreciprocal optical device. Claim 46 further requires that "adjusting the complete gap adjusts a distance between the first optical beam at the first port and the second optical beam at the third port".

The Office Action alleges that Shirasaki teaches adjusting the complete gap to adjust the distance between the first optical beam and the second optical beam. The Action further states, regarding adjusting the complete gap, "in so far as inherently at least during manufacture and assembly of the optical circulator, the first birefringent wedges and the second birefringent wedges are placed and adjusted to achieve alignment of the elements which therefore includes a corresponding adjustment in spatial separation or distance between the first and second optical beam." Applicants respectfully disagree.

The following discussion illustrates that the first and second birefringent wedges of Shirasaki use the difference between the deflection or refraction of extraordinary light and of ordinary light to operate as an optical circulator. In other words, Shirasaki teaches that the

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capability of an optical circulator is not related to a gap adjustment, as alleged in the Office Action, but is instead related to the deflection angle of the birefringent wedges. For example, Shirasaki teaches that for light from the fiber 101 to the fiber 104, “both of the polarized beams pass through the birefringent wedges 108-1 and 108-2 as extraordinary light . . . [and] are refracted as extraordinary light.” See col. 4 line 65 – col. 5 line 1.

Light incident from the fiber 104 and traveling in the opposite direction is “refracted by the birefringent wedges 108-1 and 108-2 as ordinary light.” See col. 5, lls. 29-30. Shirasaki further teaches that “because the beams are refracted by the birefringent wedges 108-1 and 108-2 as ordinary light in this case, its angle of travel is different from that of the light output from the fiber 101. Accordingly, it is focused onto the fiber 102.” See col. 5, lls. 29-32. As stated above, light incident from the fiber 101 is refracted as extraordinary light. In one direction light is refracted as extraordinary light and in the other direction light is refracted as ordinary light.

Thus, the ability of the device taught by Shirasaki to act as a circulator and direct light from fiber 101 to fiber 104 and to direct light from fiber 104 to fiber 102 is accomplished because the refraction of ordinary light and extraordinary light in a birefringent wedge is different. See col. 5, lls. 1-40. Shirasaki reinforces this teaching in Figures 3A and 3B by stating that “the refraction difference between extraordinary and ordinary light can be seen clearly.” See col. 7, lls. 6-8. In other words, deflecting the light as extraordinary light enables the device of Shirasaki to focus the light from the fiber 101 to the fiber 104. Deflecting the light as ordinary light enables the device of Shirasaki to focus light from the fiber 104 to the fiber 102. For at least this reason, Shirasaki does not disclose explicitly or inherently that adjusting the complete gap adjusts a distance between the first optical beam at the first port and the second optical beam at the third port.

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In fact, "to serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing being described in the reference, and that it would be so recognized by persons of ordinary skill." *Continental Can Co. v. Monsanto Co.* 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991). The Office Action alleges that Figs. 2, 7C, 7D, 8A, and 8D are used to support the allegation that Shirasaki inherently discloses "adjusting the complete gap" can adjust "a distance between the first optical beam at the first port and the second optical beam at the third port".

The above discussion, however, illustrates that Shirasaki relies on the differences between refracting ordinary light versus refracting extraordinary light to direct light to a different port. The Examiner states that "the first birefringent wedges and the second birefringent wedges are placed and adjusted to achieve alignment of the elements which therefore includes a corresponding adjustment in spatial separation or distance between the first and second optical beam." In Figure 2, as stated above, the first and second birefringent wedges are either both refracting extraordinary light or both refracting ordinary light depending on the direction of light travel. Thus, no matter how the first and second birefringent wedges are adjusted, both wedges are refracting the same type of light (extraordinary or ordinary) at the same angle and as a result, the spatial separation or distance between the first and second optical beam is not inherent in adjusting the first and second wedges, as suggested by the Examiner.

Further, claim 46 requires, as described above, that "the first beam angle turner turns the first optical beam to converge towards a longitudinal axis of the nonreciprocal optical device and the second beam angle turner aligns the first optical beam with the longitudinal axis". Claim 46

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also requires "that the second beam turner turns the second optical beam away from the longitudinal axis" and that "the first beam turner turns the second optical beam back towards the longitudinal axis of the nonreciprocal optical device".

In contrast, Shirasaki teaches, with respect to Figures 7A-7D, that the "average direction of two beams whose polarization planes are different after passing through the two birefringent wedges, is the same as that prior to passing through the birefringent wedges, while the split angle is changed by deflection." See col. 9, lls. 14-18. With regard to Figures 8A-8E, Shirasaki teaches that "the average refraction angle of ordinary and extraordinary light can agree with a direction from which the light enters the corresponding birefringent wedges." See col. 9, lls. 63-65. More specifically, Shirasaki teaches that "the proceeding direction of light refracted by the first birefringent wedge may be corrected by the second birefringent wedges, so that the average refraction angle of ordinary and extraordinary light can agree with an input direction of the light." See col. 10, lls. 9-13. For at least these reasons, Shirasaki does not satisfy the standard of anticipation and claims 46-47 therefore overcome the cited art.

Claim 50 is rejected under 35 U.S.C. § 102(c) as being anticipated by U.S. Patent No. 6,438,278 to Liu. The Office Action references Figure 4b as disclosing claim 50. Claim 50 requires that the first beam angle turner "causes the e-ray and the o-ray to converge to the longitudinal axis" and that "the second beam angle turner aligns the e-ray and the o-ray with the second optical port".

The Office Action identifies reference signs 16 & 62, and 38 & 64 as corresponding to the first beam angle turner and the second beam angle turner. As illustrated in Figure 4b, elements 16, 62 do not cause the e-ray and the o-ray to converge to the longitudinal axis as required by claim 50, but appear to bend "incident light with angle θ from the collimator forward

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to the symmetrical axis of the circulator." See col. 3, lls. 35-38. This is further illustrated in Figure 4b where the light, after passing through the elements 16,62 is not converging to the longitudinal axis of the circulator. Further the second beam angle turner (elements 38, 64) do not align the e-ray and the o-ray with the second optical port as required by claim 50, but appear to bend the light "in the same angle θ while propagate out of the prism." See col. 3, lls. 36-38. Because elements 38,64 do not align the light with the second optical port, Figure 4b further illustrates the need of an element 40, in addition to the elements (16, 62) and (38,64) to properly align the light with the appropriate port. Figs. 1a, 3a illustrate the need of element 40 to align the light with a port as well.

Anticipation, as previously stated, requires that the reference each and every element as set forth in the claim. As illustrated above, Liu does not teach the elements of claim 50 as set forth in claim 50. For at least these reasons, claim 50 is not anticipated by Liu and withdrawal of the rejection is respectfully requested.

Applicant respectfully notes that the above discussion should not be construed to constitute an exhaustive enumeration of the distinctions between the claims of the present application and the references cited by the Examiner. Instead, such distinctions are presented solely by way of example. Applicant notes further that the arguments presented herein have been made merely to clarify the claimed invention from elements purported by the Examiner to be disclosed by the cited prior art references. Such arguments should not, however, be construed as an acquiescence on the part of the Applicant as to the purported teachings or prior art status of any of the cited references, nor as to the characterization of the cited references advanced by the Examiner. Accordingly, Applicant reserves the right to challenge the purported teaching and prior art status of any and all of the cited references at any appropriate time.

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Conclusion

In view of the foregoing, claims 41-47 and 50-64 are in condition for allowance and favorable action is respectfully requested. In the event of any question, the Examiner is respectfully requested to initiate a telephone conversation with the undersigned.

Dated this 6th day of April 2004.

Respectfully submitted,



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